

Japanese Kokai Patent Application No. Sho 62[1987]-79404

---

Job No.: 1604-87592

Ref: 2316.1621USAZFRANZEN

Translated from Japanese by the Ralph McElroy Translation Company  
910 West Avenue, Austin, Texas 78701 USA

JAPANESE PATENT OFFICE  
PATENT JOURNAL (A)  
KOKAI PATENT APPLICATION NO. SHO 62[1987]-79404

Int. Cl. <sup>4</sup> :	G 02 B 6/24
Filing No.:	Sho 60[1985]-221373
Filing Date:	October 3, 1985
Publication Date:	April 11, 1987
No. of Inventions:	1 (Total of 3 pages)
Examination Request:	Not filed

OPTICAL SUBMARINE REPEATER ENCLOSURE

Inventor:	Yukihisa Fukumoto NEC Corp. 5-33-1 Shiba, Minato-ku, Tokyo
Applicant:	NEC Corp. 5-33-1 Shiba, Minato-ku, Tokyo
Agent:	Susumi Uchihara, patent attorney

[There are no amendments to this patent.]

Claim

An optical submarine repeater enclosure characterized by the fact that in an optical submarine repeater enclosure with an optical submarine repeater unit arranged in an external enclosure, there is a heat dissipating member used for dissipating the heat generated inside the aforementioned optical submarine repeater unit on the inner peripheral surface of the aforementioned external enclosure.

### Detailed explanation of the invention

#### Industrial application field

The present invention pertains to an optical submarine repeater. In particular, the present invention pertains to an optical submarine repeater enclosure having a heat dissipating means that is easy to assemble and has excellent handleability and stable loadability.

#### Prior art

Figure 3 is a longitudinal cross-sectional view illustrating the general configuration of an optical submarine repeater enclosure. Repeater unit (1) is loaded and fixed in external enclosure (2) by using buffers (3), plates (4) that support buffers (3) in the axial direction, and retainers (5) used for fixing these parts on external enclosure (2). The heat generated inside repeater unit (1) is dissipated from external enclosure (2) to the outside via a heat dissipating plate (6) arranged between the repeater unit and external enclosure (2). Since the repeater unit is arranged at the bottom of the sea, external enclosure (2) must form a pressure proof enclosure in order to withstand the water pressure. The external enclosure is sealed with pressure proof cover (7). Optical fiber (8) is guided into the pressure proof enclosure via feed through (9).

In a conventional example, as shown in Figure 4 which is an oblique view that displays repeater unit (1) and external enclosure (2) separately on the cross section along A-A in Figure 3, each heat dissipating plate (6) used as the aforementioned heat dissipating means is arranged on repeater unit (1), and the repeater unit with said heat dissipating plates (6) arranged on it is inserted into external enclosure (2).

#### Problems to be solved by the invention

In the conventional optical submarine repeater enclosure shown in Figures 3 and 4, when repeater unit (1) is loaded into external enclosure (2), heat dissipating plates (6) are arranged on repeater unit (1) and the heat dissipating plates (6) themselves do not have enough strength to effectively support the repeater unit with respect to the external enclosure, so a part is not present that can constantly support the repeater unit itself in a stable state. Also, repeater unit (1) itself has parts that project to the outside, so many problems exist in handling the repeater unit.

#### Means to solve the problems

In order to solve the aforementioned problems, the present invention provides an optical submarine repeater enclosure which can guarantee stable loading of the repeater unit and facilitate handling of the repeater unit by arranging a heat dissipating member on the external enclosure. That is, the present invention provides an optical submarine repeater enclosure characterized by the fact that in an optical submarine repeater enclosure with an optical

submarine repeater unit arranged in an external enclosure, there is a heat dissipating member used for dissipating the heat generated inside the aforementioned optical submarine repeater unit on the inner peripheral surface of the aforementioned external enclosure.

#### Application example

In the following, an application example of the optical submarine repeater enclosure disclosed in the present invention will be explained with reference to the structure of the optical submarine repeater shown in Figure 3 and with reference to Figures 1 and 2 that show the configuration and heat dissipating member of the repeater enclosure disclosed in the present invention, respectively.

Figure 1 is an exploded oblique view illustrating repeater unit (1) and external enclosure (2) on the cross section viewed from A-A in Figure 3 that shows the general structure of a conventional optical submarine repeater enclosure. It shows the state when heat dissipating member (10) instead of a conventional heat dissipating plate is arranged on the inner peripheral surface of the external enclosure. Figure 2 is an oblique view illustrating an application example of heat dissipating member (10) disclosed in the present invention.

In order to improve heat dissipation, when repeater unit (1) is inserted into external enclosure (2), said heat dissipating member (10) comprises two parts such that they can be closely adhered to the outer peripheral surface of the repeater unit and the inner peripheral surface of the external enclosure. That is, as shown in Figure 2, one of the parts is cylindrical part (10) [sic; (10a)] which has slit (11) and is radially elastic and is made of a metal with good heat conductivity. The other part is comprised of multiple arcuate plates (10b) made of a metal with good heat conductivity and arranged at prescribed intervals along the circumference on the inner peripheral surface of cylindrical part (10a). Each of said arcuate plates (10b) also has a certain elasticity in the radial direction. It is desired that the outer diameter of cylindrical part (10a) [sic; (10a)] in the free state is a little larger than the inner diameter of the external enclosure. Since the rest of the structure of the optical submarine repeater disclosed in the present invention is identical to the conventional structure shown in Figure 3, explanation is omitted.

To install the heat dissipating member of the present invention, the heat dissipating member (10) comprised of cylindrical part (10a) and arcuate plates (10b) is inserted into external enclosure (2) while being pressed slightly in the radial direction. When the heat dissipating member is elastically expanded and has pressurized contact [with the external enclosure], repeater unit (1) is inserted into the heat dissipating member with its external peripheral surface applying a slight elastic action against arcuate plates (10b).

### Effect of the invention

As explained above, in the optical submarine repeater enclosure disclosed in the present invention, instead of being arranged on the repeater unit, the heat dissipating member is arranged as a secure constituent part on the inner peripheral surface of the external enclosure. Therefore, the repeater unit itself does not have unstable parts that project outwards, and a stable insertion internal hole identical to the structure of the coaxial repeater unit is formed. Consequently, the repeater unit can be loaded very smoothly into the external enclosure during the assembling operation. Also, after the assembly, the stable state of the repeater unit can be maintained easily.

### Brief description of the figures

Figure 1 is a partially-cut exploded oblique view illustrating the optical submarine repeater enclosure disclosed in the present invention. Figure 2 is a partially exploded oblique view illustrating the heat dissipating member of the present invention. Figure 3 is a longitudinal cross-sectional view illustrating the general structure of an optical submarine repeater enclosure. Figure 4 is a partially-cut exploded oblique view illustrating a conventional optical submarine repeater enclosure.

- 1 Repeater unit
- 2 External enclosure
- 3 Buffer
- 4 Plate
- 5 Retainer
- 6 Heat dissipating plate
- 7 Pressure proof cover
- 8 Optical fiber
- 9 Feed through
- 10 Heat dissipating member
  - 10a Cylindrical part
  - 10b Arcuate plate
- 11 Slit

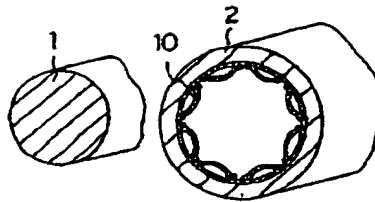


Figure 1

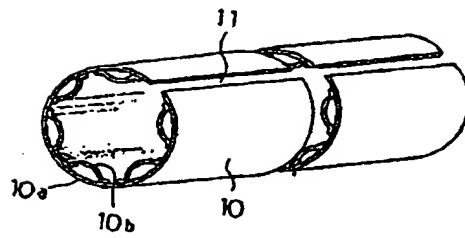


Figure 2

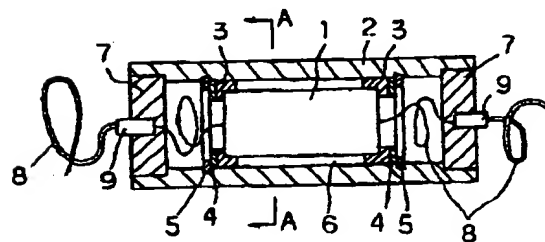


Figure 3

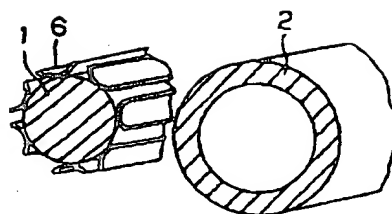


Figure 4